DEVELOPING ANP TO RANK THE BRANCHES OF AN INSURANCE COMPANY BASED ON SERVQUAL

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ABSTRACT

The purpose of this paper is to show how the SERVQUAL scale and ANP model can be used to effectively and scientifically rank strategies within the insurance service quality sector, instead of traditional models. This approach is used to show how the ranking decision changes as a function of service quality utilizing the ANP model. This study evaluated the quality of services of the DANA insurance company branches by measuring policy holders' views toward the current and the expected levels of quality. The standard questionnaire "SERVQUAL", which emphasizes measuring the gap between the level of current and expected quality, was used. The proposed algorithm utilized the Analytic Network Process (ANP), which allows measurement of the dependency among the quality dimensions, to rank the branches. The results showed a difference between policy holders' expectations and the current level of quality of services in all dimensions of service quality. According to the ANP limit super matrix, there was a significant difference between the proposed ranking approach and the traditional one.

Keywords: ANP, SERVQUAL, Service Industry.

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1. Introduction

Rational decision-making is a talent that must be encouraged if we want to be more effective in implementing our ideas in the real world with its risks and resistance to change. There are two types of decisions, normative and descriptive. The first, normative decision making, determines what we prefer the most, and in these circumstances it is easy to see why one does not wish anything to happen that could undermine the best choice that is made. The second, descriptive decision making, is used to make the best choice given all the influences in the world around us that could affect the optimality of any choice that is made (Whitaker, 2007). In reality the quality of any choice that is made depends on how well we know our alternatives as compared with each other and with others outside the collection in order that the alternatives may be ranked. Decision making involves prioritizing ideas according to current or future circumstances.

A fundamental problem in service quality lies in one's ability to measure its intangible criteria and interpret these criteria sensibly. The ANP is fundamentally a way to measure intangibles factors by using pair wise comparisons with judgments that represent the dominance of one element over another with respect to a property that they share (Saaty & Khouja, 1976). The ANP has been found useful in decision making which involves numerous intangible criteria such as insurance industry service quality. It is a process of laying out a structure of all the essential factors that influence the outcome of a decision. Then numerical pair wise comparison judgments are elicited to express people's understanding of the importance, performance or likely influence of these elements on the final outcome. The final outcome is obtained by synthesizing the priorities derived from different sets of pair wise comparisons, and finally a sensitivity analysis is performed to determine the stability of the outcomes to wide perturbations in the judgments (Saaty, 1980).

Undoubtedly all organizations seek to attain increased service quality; however this issue is of greater importance in service organizations because their share of the macro economy is about seventy percent (Foroughi et al., 2011). Service quality is increasingly becoming a critical determinant of business performance and a strategic tool for gaining a competitive advantage, so measuring its level has been a matter of grave concern for both practitioners and researchers during the past two decades (Gale et al. 1994).

Notwithstanding, the most popular measure of service quality is SERVQUAL, which was developed by Parasuraman in 1988. (Parasuraman et al. 1988) A number of applications of SERVQUAL have been reported in a variety of settings (Ladhari, 2009). The SERVQUAL instrument is comprised of five dimensions with 22 items. Analysis of the data can take several forms such as item-by-item analysis, dimension-by-dimension analysis and computation of the single measure of overall service quality (Cooper et al. 2000).

Services play an increasingly important role in the economy of the Islamic Republic of Iran (I.R.I) and the global economy. Services have in fact become more important than goods, for example, services produced by Iranian insurance companies accounted for 1% of the gross domestic product (GDP) in 2011, and are projected increase to 1.45% by 2015 (BMI, 2011). Services differ from goods in several important ways. For example, while goods are tangible and can be stored, services are often intangible and must be produced and consumed simultaneously (Capar & Kotabe, 2003). To the best of our knowledge, studies utilizing ANP to rank insurance branches based on their service quality are lacking. To fill this gap, we scientifically ranked the branches of firms operating in the financial service industry, specifically the insurance industry, utilizing the ANP. These branches were ranked based on their service quality level.

Our decision to study the insurance industry is motivated by several factors. First, the insurance industry has experienced an acceptable volume of domestic direct and indirect investment in recent years in Iran mainly due to new technological advancements and governmental liberalization policies which have created many opportunities for private insurance companies to become active in the financial market. This has made the insurance industry one of the largest service industries in Iran. Second, since insurance policy holders develop a long-term relationship with their insurance company by paying a premium over a long period of time, and are likely to have a specific interest in the performance of their insurers (Parente, 2010). These reasons along with the lack of international management research on insurance companies and their branches, especially their ranking methods, make the insurance industry interesting to study.

2. SERVQUAL

Several definitions of service quality exist in the research literature. Some define the quality of the perceived service as the result of the assessment of the clients' expectations and the perceived services. Service quality is a stable criterion that indicates how the presented services correspond with the clients expectations. Others define service quality as the presentation of services in a way that exceeds the client's expectations (Gaglianoo & Hathcot, 1994, Jabonoun & Al Tamimi, 2003). The most comprehensive and widely accepted definition belongs to Parasuraman et al (1985). According to this definition, service quality is related to satisfaction, but not equal to that. It is attained by measuring the difference between clients' expectations and their perceptions of the service. Parasuraman et al (1985, 1991, 1994) identified 10 dimensions in their studies for the identification of service quality: facilities, reliability, responsibility, communication, credit, security, qualification, politeness, understanding of the client, and availability. Later, they summarized these into five dimensions. SERVQUAL can also be defined as a multiple-item scale composed of five dimensions and 22 items for measuring consumer perceptions of service quality (Hakyeon Le, 2012). Table 1 presents the five dimensions of SERVQUAL. This survey instrument includes 22 items for measuring expectations (E), and the corresponding 22 items for measuring perceptions (P) of the clients (policy holders). A seven point Likert scale from "Strongly Disagree (1) to Strongly Agree (7)" can be used for measurement. For each item, a difference score gap (G) is obtained by determining the difference between the ratings for perception (P) and expectation (E) that is; G = P –E (Parasuraman et al. 1994).

Table1
Dimensions of SERVQUAL (Parasuraman et al., 1994)

Dimensions	Definition	Number of item
Tangible	Physical facilities, equipment, appearance of personnel and organization accommodations	4
Reliability	Ability to perform the promised service dependably, accurately and precisely	5
Responsiveness	Willingness to help customers and provide prompt service, and disposition to quickly serve the clients	4
Assurance/ Guarantee	Knowledge and courtesy of employees and their ability to inspire trust and confidence	4
Empathy/ Sympathy	Caring, individualized attention the firm provides to its customers / personal attention to each client	5

3. Literature review

The ANP is a mathematical theory that can deal with all kinds of dependence systematically, and has been successfully applied in many fields (Chung et al., 2005). ANP has a systematic approach to set priorities and trade-offs among goals and criteria, and can also measure all tangible and intangible criteria. Many decision problems cannot be structured hierarchically because they involve the interaction and dependence of higher-level elements with lower-level elements. Not only does the importance of the criteria determine the importance of the alternatives as in a hierarchy, but also the importance of the alternatives themselves determines the importance of the criteria. Also feedback enables us to determine what must be done to attain a desired future. The Analytic Network Process (ANP) is a generalization of the Analytic Hierarchy Process (AHP), and its' feedback structure looks more like a network, with cycles connecting components of elements with loops that connect a component to it (Figueira et al., 2005). Multiple criteria decision making (MCDM) methods are based on the additive concept along with the independence assumption, but an individual criterion is not always completely independent for solving the interactions among elements. The ANP, a relatively new MCDM method, was proposed by Saaty (1996) and its greatest advantage is that it can handle intangible factors based on individual or collective judgments of the situation (Saaty & Vargas, 2006). Therefore, based on these advantages, the ANP was used for modeling and comparing in this research.

This study involves numbers of pair wise comparisons for deriving the priorities of branches of insurance companies' evaluation and ranking. It synthesizes experts' opinions to determine compliance with the geometric mean method (Buckley, 1985). The valuation scales used in the study are those recommended by Saaty (1980, 1996, 2005) where 1 represents equal importance, 3 moderate importance, 5 strong importance, 7 very strong or demonstrated importance, and 9 represents extreme importance. Even numbered values will fall in between importance levels. Reciprocal values (e.g. 1/3, 1/5, etc.) mean less importance, even less importance, etc. Saaty (1980) proved that for the consistent reciprocal matrix, the λ max value is equal to the number of comparisons, or λ max = n.

A measure of consistency, called the Consistency Index, is a deviation or degree of consistency using the following formula. If the value of I.I. Ratio [I.I. = (λ max − n)/ (n−1)] is smaller or equal to 10%, the inconsistency is acceptable. If the I.I. ratio is greater than 10%, the subjective judgment needs to be revised. n in the mentioned formula denotes the number of elements that have been compared. When λ max = 0, the complete consistency exists within judgment procedures and then λ max = n. The consistency ratio (I.R.) of I.I. to the mean random consistency index (I.I.R) is expressed as I.R. (I.R. = I.I. / I.I.R) less than 0.1. By using the process above, an un-weighted supermatrix is composed. Its columns contain the priorities derived from the pairwise comparisons of the elements. In an un-weighted supermatrix, the columns may not be column stochastic to obtain a stochastic matrix, i.e., each column sums to one. The blocks of the un-weighted supermatrix should be multiplied by the corresponding cluster priority. To derive the overall priorities of elements, this method involves multiplying sub matrices numerous times in turn until the columns stabilize and become identical in each block of sub-matrices. The weighted supermatrix can then be raised to limiting powers to calculate the overall priority weights. The ANP employs the limiting process method lim $k\to\infty$ Wk of the powers of the supermatrix (Saaty, 1996, Meade & Sarkis, 1998, Sekitani & Takahashi, 2001, Tseng et al., 2008). For synthesizing overall priorities for the alternatives, the un-weighted supermatrix requires adjusting in order to keep it column stochastic (Sarkis 1999). The strength of the ANP lies in its use of ratio scales to capture all kinds of interactions, formulate accurate predictions, and make better decisions (Saaty, 2003).

The traditional annual ranking model considers only the annual sale (portfolio) of a branch, and this method could unfortunately lead to much dishonesty. Falsification of accounts and quality level ignorance in branches are the greatest deficiencies of this method as opposed to our proposed algorithm SERVQUAL utilizing ANP. The proposed algorithm would ensure the elimination of account falsification and the establishment of quality management. This is true because of the mathematical approaches property.

4. Research method

In this research, we aimed to clarify the current state of the service quality level of the insurance service industry in Iran. We used five SERVQUAL dimensions as the research criteria provided by the branches as the research alternatives in both underwriting and loss adjusting sections in order to rank them by ANP. Figure 1 shows the proposed algorithm using the ANP in order to determine the overall priorities of the criteria identified with the SERVQUAL analysis in order to rank the alternatives.

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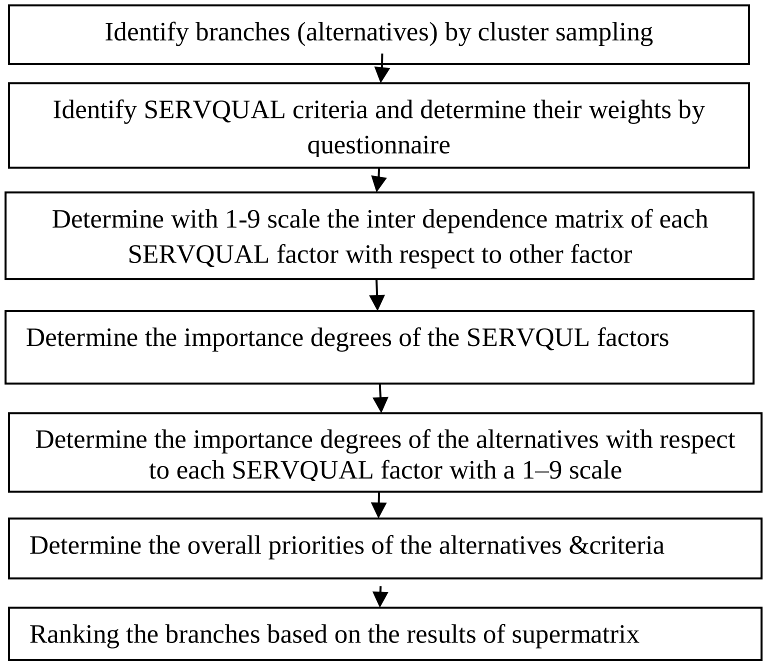

Figure1. Algorithm of branches ranking by ANP based on service quality

The research method was a descriptive-survey which was selected on the basis of the nature of this research. The population of this research included all the policy holders who were living in Zone 1(this zone contains the policy holders who are in Tehran and will be described later in this paper) from 2012 to 2013. 376 policy holders were sampled based on the volume sample assessment formula as suggested by Parasuraman (1985) and Foroughi Abari (2011). Since the population of the research was all policy holders in Tehran, access to all of them was time consuming and costly, so the volume sample assessment "formula no. 1" was adopted to estimate the number of sample elements. The instrument was the standard SERVQUAL-Parasuraman questionnaire which was designed on the basis of a Likert seven point scale and distributed among the participants (Parasuraman et al. 1994). To analyze the data, SPSS software was used at the two levels of descriptive and analytical statistics. At the level of descriptive statistics, frequency, percentage, mean and standard deviation were used, and at the level of analytical statistics dependent t-tests were used to investigate the policy holders' opinions. The number of sample elements was calculated according to the following formula: (Lapin, 1990).

$$n = \frac{z^2\sigma^2}{d^2} \qquad (1)$$

d=desired precision (or maximum error)

σ^2 =assumed population variance

$Z_{\alpha/2}$ =critical normal deviate for specified reliability1-α

To calculate the variance and reliability 40 questionnaires were distributed among policy holders. The variance was equal to 0.5789, and previous studies indicated a desired precision of d=0.077 with a reliability probability of 1-α=.95. From the critical normal deviate values table we know that $Z_{0.025}$=1.96, thus the required sample size was 376 (rounded). The reliability was estimated via Cronbach's alpha (perceptions 92% and expectations 90%) by SPSS software which was more than the acceptable percentage (70%), so the reliability of the questionnaire was accepted. Figure 2 shows the network on which the algorithm was proposed. This network was obtained from a group of experts consisting of three Assistant Professors at Azad Islamic University and two top managers of the Dana insurance company. It was based on the assumption that each branch as an element of the cluster should be compared with respect to its importance with the five SERVQUAL criteria and vice versa. It contains 4 alternatives (four branches) and five criteria (SERVQUAL factors), and the goal of the model was to find the superior branch according to policy holders' opinions.

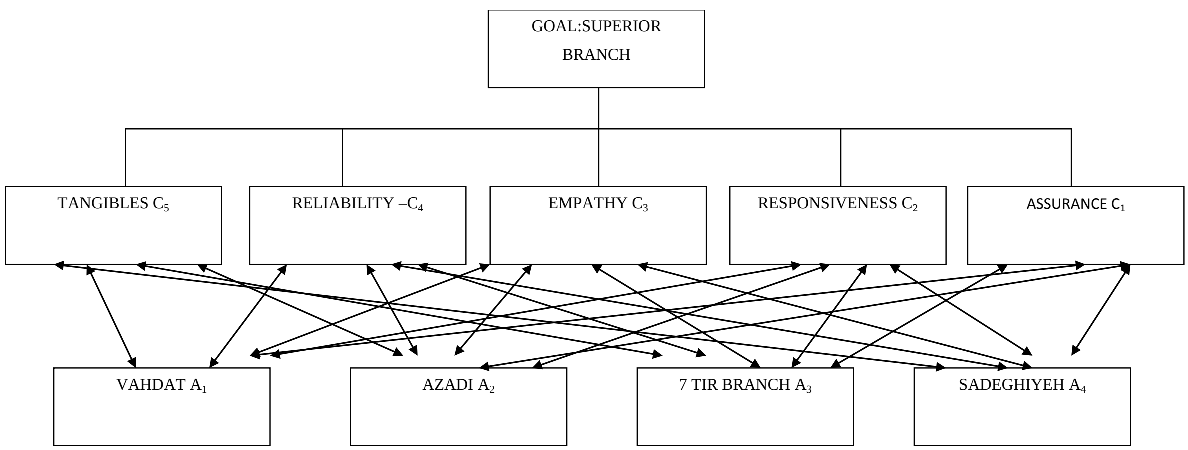

Figure 2. Network used to identify the superior branch of an insurance company based on SERVQUAL

The ANP is composed of four major steps (Saaty, 2003):

Step 1: Model construction and problem structuring: The problem should be stated clearly and be decomposed into a rational system, like a network. This network structure can be obtained by decision-makers through brainstorming or other appropriate methods.

Step 2: Pairwise comparison matrices and priority vectors: Similar to the comparisons performed in AHP, pairs of decision elements at each cluster are compared with respect to their importance towards their control criteria. The clusters themselves are also compared with respect to their contribution to the objective. Decision-makers are asked to respond to a series of pairwise comparisons of two elements or two clusters to be evaluated in terms of their contribution to their particular upper level criteria. In addition, interdependencies among elements of a cluster must also be examined pairwise; the influence of each element on other elements can be represented by an eigenvector. The relative importance values are determined with Saaty's 1–9 scale (Table 2), where a score of 1 represents equal importance between the two elements and a score of 9 indicates the extreme importance of one element (row cluster in the matrix) compared to the other one (column cluster in the matrix) (Meade,1999). A reciprocal value is assigned to the inverse comparison, that is, a_{ij} ¼ 1=a_{ji}, where a_{ij} (a_{ji}) denotes the importance of the i_{th} (j_{th}) element. Pairwise comparison is performed in the framework of a matrix, and a local priority vector can be derived as an estimate of the relative importance associated with the elements (or clusters) being compared by solving the following equation:

$$A \times W = \lambda_{MAX} \,.\, W$$

Where A is the matrix of pair-wise comparison, W is the eigenvector, and λ_{max} is the largest eigenvector value. Saaty (1980) proposes several algorithms to approximate W ⍰. In this paper, Super Decisions software is used to compute the eigenvectors from the pair-wise comparison matrices and to determine the consistency ratios.

Table 2
Saaty's 1–9 scale for AHP & ANP preference (Saaty, 1996)

Intensity of importance	Definition
1	Equal importance
3	Moderate importance
5	Strong importance
7	Very strong importance
9	Absolute importance
2,4,6,8	Intermediate importance
Reciprocal of above non-zero numbers	If activity i has one of the above non-zero numbers assigned to it when compared with activity j, then j has the reciprocal value when compared with i

Each matrix should be normalized by the following formula:

$$a_{ij} = \frac{\frac{1}{a_{ij}}}{\sum_{i=1}^{m} \frac{1}{a_{ij}}} \qquad (2)$$

The consistency index that was chosen is as below: (Figueira et al., 2005)

$$I.I. = \frac{\lambda_{MAX} - n}{n - 1} \qquad (3)$$

And the rate of inconsistency was calculated according to the following formula:

$$I.R. = \frac{I.I}{I.I.R} \qquad (4)$$

Table 3 shows where *I.I.R random index* is chosen from random index table.

Table 3
Random index table (Figueira et al., 2005)

Order	1	2	3	4	5	6	7	8	9
I.I.R	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45

Step 3: Supermatrix formation: The Supermatrix concept is similar to the Markov chain process (Saaty, 1996). To obtain global priorities in a system with interdependent influences, the local priority vectors are entered in the appropriate columns of a matrix. As a result, a supermatrix is actually a partitioned matrix, where each matrix segment represents a relationship between two clusters in a system. The local priority vectors obtained in Step 2 are grouped and placed in the appropriate positions in a supermatrix based on the flow of influence from one cluster to another, or from a cluster to itself, as in the loop. A standard form for a Supermatrix is as shown below.

$$w_{ij} = \begin{bmatrix} w_{11} & w_{1k}\ldots\ldots & w_{1n} \\ w_{k2} & w_{kk}\ldots\ldots & w_{kn} \\ & & \\ w_{n1} & w_{nk}\ldots\ldots & w_{nn} \end{bmatrix}$$

Note that any zero value in the supermatrix can be replaced by a matrix if there is an interrelationship of the elements within a cluster or between two clusters. Since there is usually interdependence among clusters in a network, the columns of a supermatrix may sum to more than one. However, the supermatrix must be modified so that each column of the matrix sums to unity. An approach recommended by Saaty (1996) involves determining the relative importance of the clusters in the supermatrix, using the column cluster as the controlling cluster. That is, row clusters with non-zero entries in a given column cluster are compared according to their impact on the cluster of that column cluster. An eigenvector is obtained from the pairwise comparison matrix of the row clusters with respect to the column cluster, which in turn yields an eigenvector for each column cluster. The first entry of the respective eigenvector for each column cluster is multiplied by all the elements in the first cluster of that column; the second by all the elements in the second cluster of that column and so on. In this way, the cluster in each column of the supermatrix is weighted, and the result, known as the weighted supermatrix, is stochastic. Raising a matrix to exponential powers gives the long-term relative influences of the elements on each other. To achieve convergence on the importance weights, the weighted supermatrix is raised to the power of 2k + 1, ($W=\lim W^{2k+1}$) where k is an arbitrarily large number; the new matrix is called the limit supermatrix (Saaty, 1996). The limit supermatrix has the same form as the weighted supermatrix, but all the columns of the limit supermatrix are the same. The final priorities of all elements in the matrix can be obtained by normalizing each cluster of this supermatrix. Additionally, the final priorities can be calculated using matrix operations, especially where the number of elements in the model is relatively few. Matrix operations are used in order to easily convey the steps of the methodology and how the dependencies are worked out.

Step 4: Selection of the best alternatives: If the supermatrix formed in Step 3 covers the whole network, the priority weights of the alternatives can be found in the column of alternatives in the normalized supermatrix. On the other hand, if a supermatrix only comprises clusters that are interrelated additional calculations must be made to obtain the overall priorities of the alternatives. The alternative with the largest overall priority should be selected, as it is the best alternative as determined by the calculations made using matrix operations.

5. Case study

This section presents an illustration of the proposed approach summarized in the previous sections. In the following case study, the SERVQUAL method utilizing the ANP analysis was performed on the Dana Insurance Company. Dana Insurance Company is one of the largest Iranian insurance companies among the forty active insurance companies in the country, and controls one fifth of the total insurance market. It has more than 40 branches throughout the country which are divided in to 8 zones. Zone 1 is in Tehran and consists of 4 branches. Despite the huge market share and portfolio of this firm, it uses the traditional ranking system to assess the efficiency of its branches. It has three types of branches (superior branch, level 1 branch and level 2 branch) whose portfolios are annually assessed by the traditional method (annual sale level), then ranked by the level of the annual sale level of the portfolio. This ineffective kind of assessment and ranking system causes many internal problems for branches such as falsification of accounts, property wastefulness, oppression of staff, and infringing on policy holders' rights. Many other damages to society and the economy result because of this traditional method.

In this paper we want to eradicate these deficits by our proposed model which is a scientific approach utilizing ANP. The data for the five dimensions of SERVQUAL for service quality units were generated through the standard SERVQUAL questionnaire for both perceptions and expectations in the four branches as our alternatives. These questionnaires were sent to policy holders via their e-mail, post address or in person when they visited the branches. Then, ANP was conducted with the data set of SERVQUAL. Table 4 presents the generated data and results of the SERVQUAL questionnaires.

The statistical analysis revealed that the mean for expectations was 22.056 and was 19.203 for perceptions. The t test result was 23.22 at $p = .001$, so the data analysis of the policy holders' expectations and perceptions in all dimensions of service quality showed that they were significant at $p<0.05$. There was a gap between their expectations and their perceptions which showed that the insurer could not satisfy the policy holders' expectations.

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Table4
Generated data of SERVQUAL questionnaires on insurance branches

criteria / alternatives	c_1	c_2	c_3	c_4	c_5	Total
A_1	0.5025	0.7475	0.7046	0.9488	0.5268	3.4312
A_2	0.541	1.1375	0.6474	0.6928	0.60825	3.627
A_3	0.7075	0.7225	0.5666	0.832	0.725	3.554
A_4	0.8875	1.1925	0.284	0.926	0.4	3.69

5.1 ANP application on SERVQUAL data set

In this section, ANP is applied to the data generated from the SERVQUAL questionnaires' results and analyses which are summarized in Table 4. First, each SERVQUAL criterion is compared with respect to alternatives (A), and then each alternative with respect to criteria (B).

A: Comparison of criteria with all alternatives: five service quality dimensions are compared with respect to four insurance branches.
B: Comparison of alternatives with all criteria: four insurance branches which are considered as alternatives are compared with respect to five SERVQUAL dimensions.

The results of these comparisons are shown in Table 5 as a super matrix and Table 6 as the limit super matrix.

5-1-a- Criteria comparison with alternatives
5-1-a-1- Assurance criterion (c_1) comparison with alternatives:

$$w=\begin{bmatrix} .312 \\ .289 \\ .223 \\ .176 \end{bmatrix} \rightarrow I.I=\frac{4.0045-4}{3}=0.0015 \rightarrow I.I.R=\frac{0.0015}{0.9}=0.0017\langle 0.1$$

5-1-a-2- Responsiveness criterion (c_2) comparison with alternatives:

$$w=\begin{bmatrix} .301 \\ .198 \\ .312 \\ .189 \end{bmatrix} \rightarrow I.I=\frac{4.0015-4}{3}=0.0005 \rightarrow I.I.R=\frac{0.0005}{0.9}=0.0055\langle 0.1$$

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5-1-a-3- Empathy criterion (c_3) comparison with alternatives:

$$w=\begin{bmatrix}.172\\.187\\.214\\.427\end{bmatrix}\rightarrow I.I=\frac{4.0075-4}{3}=0.0025\rightarrow I.I.R=\frac{0.0025}{0.9}=0.0003\langle 0.1$$

5-1-a-4- Reliability criterion (c_4) comparison with alternatives:

$$w=\begin{bmatrix}.221\\.302\\.251\\.226\end{bmatrix}\rightarrow I.I=\frac{4.0000-4}{3}=0.0000\rightarrow I.I.R=\frac{0.0000}{0.9}=0.0000\langle 0.1$$

5-1-a-5- Tangibles criterion (c_5) comparison with alternatives:

$$w=\begin{bmatrix}.256\\.221\\.186\\.337\end{bmatrix}\rightarrow I.I=\frac{4.00125-4}{3}=0.0042\rightarrow I.I.R=\frac{0.00042}{0.9}=0.00046\langle 0.1$$

5-1-b-Alternatives comparison with criteria:
5-1-b-1- Vahdat branch (A_1) comparison with all Servqual criteria:

$$w=\begin{bmatrix}.146\\.218\\.205\\.277\\.154\end{bmatrix}\rightarrow I.I=\frac{5.0004-5}{4}=0.0001\rightarrow I.I.R=\frac{0.0001}{1.12}=0.00009\langle 0.1$$

5-1-b-2- Azadi branch (A_2) comparison with all Servqual criteria:

$$w=\begin{bmatrix}.149\\.313\\.179\\.191\\.168\end{bmatrix}\rightarrow I.I=\frac{5.045-5}{4}=0.1125\rightarrow I.I.R=\frac{0.1125}{1.12}=0.01\langle 0.1$$

5-1-b-3- Seven Tir branch (A_3) comparison with all Servqual criteria:

$$w=\begin{bmatrix}.199\\.203\\.159\\.234\\.204\end{bmatrix}\rightarrow I.I=\frac{5.0146-5}{4}=0.00365\rightarrow I.I.R=\frac{0.0365}{1.12}=0.0033\langle 0.1$$

5-1-b-4- Sadeghiyeh branch (A_3) comparison with all Servqual criteria:

$$w=\begin{bmatrix}.241\\.323\\.077\\.251\\.108\end{bmatrix}\rightarrow I.I=\frac{5.0008-5}{4}=0.0002\rightarrow I.I.R=\frac{0.0002}{1.12}=0.00018\langle 0.1$$

Table 5
The super matrix of insurance branches ranking

	C_1	C_2	C_3	C_4	C_5	A_1	A_2	A_3	A_4
C_1	0	0	0	0	0	0.146	0.149	0.199	0.241
C_2	0	0	0	0	0	0.218	0.313	0.203	0.323
C_3	0	0	0	0	0	0.205	0.179	0.159	0.077
C_4	0	0	0	0	0	0.277	0.191	0.234	0.251
C_5	0	0	0	0	0	0.154	0.168	0.204	0.108
A_1	0.312	0.301	0.172	0.221	0.256	0	0	0	0
A_2	0.289	0.198	0.187	0.302	0.221	0	0	0	0
A_3	0.223	0.312	0.214	0.251	0.186	0	0	0	0
A_4	0.176	0.189	0.427	0.226	0.337	0	0	0	0

Table 6
The limit super matrix of insurance branches ranking

	C_1	C_2	C_3	C_4	C_5	A_1	A_2	A_3	A_4
C_1	0	0	0	0	0	0.183964317	0.183985235	0.183801168	0.184074242
C_2	0	0	0	0	0	0.222924826	0.222833677	0.222043687	0.222245302
C_3	0	0	0	0	0	0.174698925	0.174663932	0.174518175	0.174540533
C_4	0	0	0	0	0	0.238944804	0.238939172	0.238707585	0.238948024
$w^5 = C_5$	0	0	0	0	0	0.177914046	0.177891411	0.177743204	0.177818801
A_1	0.256763133	0.256736739	0.256607967	0.256714	0.2566763	0	0	0	0
A_2	0.241457809	0.241424701	0.241387689	0.241436	0.2414222	0	0	0	0
A_3	0.245708829	0.245688855	0.245625035	0.245676	0.2456764	0	0	0	0
A_4	0.255427991	0.255416433	0.25575823	.0255504	0.2556396	0	0	0	0

6. Results

The aim of this research was to assess the service quality of the branches of insurance companies by applying the SERVQUAL model and combining the results with ANP in order to propose a scientific ranking model. The participants included policy holders who were randomly selected by cluster sampling method, and the instrument used was the standard SERVQUAL questionnaire with five dimensions (assurance, empathy, tangibles, responsiveness and reliability). The reliability of the instrument was measured by Cronbach's alpha (perceptions 0.92 and expectations 0.90). Data analysis was conducted and revealed that there was a gap in the policy holders' expectations ($\mu = 22.056$) and perceptions ($\mu = 19.203$) which was significant at $p<0.05$. Results showed that alternatives ranked in this order: 1-Vahdat, 2-Sadeghiyeh, 3-Seven Tir, 4-Azadi and were not in accordance with the traditional assessment ranking system where they were ranked as: 1-Azadi, 2- Seven Tir, 3-Sadeghiyeh, 4-Vahdat. Figure 3 shows the traditional assessment of the portfolios, and Table 7 shows the priorities of criteria. Table 8 shows the ranking of alternatives based on the proposed model which proved that there was a significant difference between the traditional ranking model and the engineering proposed model.

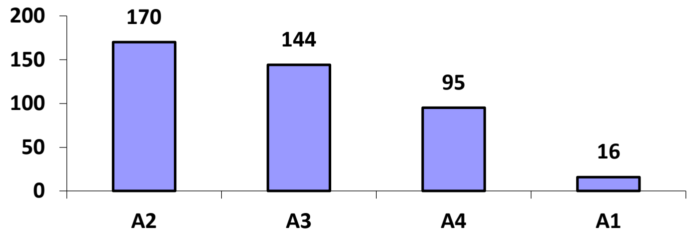

Figure 3. Traditional assessment and ranking system of insurance branches (Portfolio billion of Rials)

Table 7
Prioritization of criteria (SERVQUAL dimensions) by the proposed engineering model from the limit super matrix

Ranking	Element
1	C4
2	C2
3	C1
4	C5
5	C3

Table 8
Ranking of alternatives (branches) by the proposed engineering model from the limit super matrix

Ranking	Element
1	A1
2	A4
3	A3
4	A2

7. Conclusion

Successful management starts with a proper assessment system that is chosen through a robust evaluation method. Akhlaghi et al (2012) assessed the quality of educational services in Ahvaz Technical College via the SERVQUAL model. Also, Hakyeon et al (2012) proposed a data envelopment analysis (DEA) approach to computation of a measure of overall service quality and benchmarking when measuring service quality with SERVQUAL. Foroughi et al (2011) evaluated the quality of services at a postgraduate school in a non-governmental university. Students' views toward the current and expected levels of quality via SERVQUAL scale were measured at the Islamic Azad University-Khorasgan branch. Ramon et al (2012) explored the problem of integrating semantically heterogeneous data (natural language included) from various websites with opinions about e-financial services. They developed an extension of the fuzzy model based on semantic translation (FMST) under the perspective of the service quality (SERVQUAL) stream of research. In 2011, Yucenur et al proposed a model for selecting of the global supplier by the Analytical Hierarchy Process (AHP) and the

Analytical Network Process (ANP) based on linguistic variable weight and then fuzzy AHP and fuzzy ANP results were compared.

The ANP is a relatively new MCDM method which can deal with many interactions systematically, unlike traditional MCDM methods which are based on the independence assumption. The ANP can be used not only as a way to handle the inter-dependences within a set of criteria, but also as a way of producing more valuable information for decision-making. This paper proposes a solution based on combining ANP and the SERVQUAL in a management assessment system. This approach helps the decision-making team to have a proper solution in the management and ranking system. The results of this study showed that there was a significant difference between the traditional assessment of branches and the mathematically proposed model. So, after conducting the SERVQUAL model, it was revealed that service quality functioning of branches in the five dimensions was slightly below the mean and that there was a gap between the perception of the present situation and expectations from the viewpoint of the policy holders. Therefore, if the insurance companies want to be efficient and effective so as not to lose their market shares their annual assessment system should be converted to the scientific model.

Fuzzy numbers can be introduced in the ANP method to more effectively analyze cases having greater uncertainty in the pair wise comparison matrices for future research. Based on the general findings of the research, and in order to continuously improve the process of service quality, it is necessary to repeat this research every year to examine the changes in expectations and perceptions of the policy holders and to identify new needs and trends. Benchmarking can be a useful tool in this industry when considering expectations and perceptions. Finally, decision-makers should leave behind the traditional methods of assessment, and move to the scientific approach, such as the engineering model, which is proposed in this paper in order to effectively and efficiently cope with future.

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